Challenges in building creativity and innovation into NPD process – results from a case study

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Abstract: Research in NPD has identified a number of organisational practices associated with supporting organisational creativity and innovation including frequent and open communication, cross functional work, building organisational slack, the implementation of high involvement schemes, attitude to risk and top management commitment. Using a single case study approach, this paper explores the challenges associated with the implementation of such organisational practices in the R&D department of a large telecommunication company. Challenges include sequential involvement of functions in the team, broken communication between different teams, management attitude to resource constraints, short term pressures due to dynamic market, and limited management support for the implementation of idea generation schemes.

Keywords: organisational creativity; innovation; new product development, cross-functional teams

1 Introduction

This paper examines the approach to stimulating creativity and innovation in new product development (NPD). Existing literature identifies a number of practices that are useful to support creativity in NPD development, such as increasing information diversity through the use of cross functional teams, and the development of a creative organisational climate [1, 2] by building in organisational slack, implement high involvement (HI) schemes or support open communication to build trust among team members [3, 4]. The objective of this paper is to explore the adoption of these practices in a particular organisation in order to reveal the challenges associated with the implementation of these "best practices". The findings of this study shed some light on the constraints that organisation face when adopting such "best practices" to support creativity, as well as providing some indications to managers of how to deal with these challenges.

The structure of the paper is as follows. The first section identifies the some of the practices associated with supporting creativity in NPD. The second part explains the research design employed in this paper. The case study and the practices adopted within the organisation are explored in the third part. The fourth section identifies the challenges

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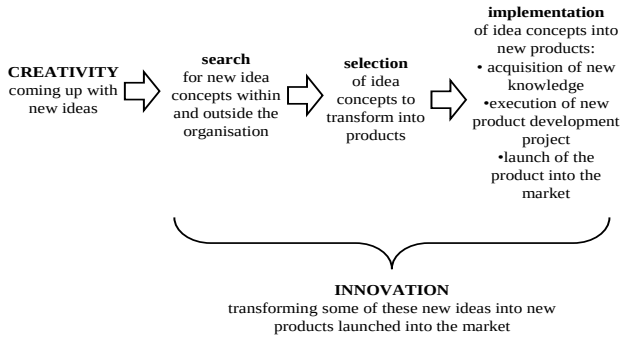
associated with the implementation of these practices in the organisation under study. The last part discusses identifies and discusses some tentative conclusions & practical implications.

2. Creativity and innovation in NPD

Creativity and innovation are two critical aspects of NPD process. Creativity refers to the ability to come up with new ideas while innovation refers to the process of transforming these ideas into successful new products that are launched into the market [4]. While creativity is an ability that individuals, teams and organisations posses, innovation is generally understood as a process that organisations manage. This relation between the two concepts is illustrated in the figure below.

Figure 1 Creativity and innovation.



This interpretation of creativity and innovation is widely accepted nowadays in the NPD literature [1, 2].

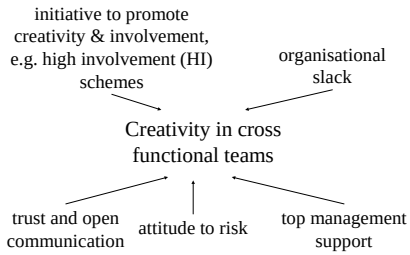
The use of **cross functional teams** to improve the idea generation stage (i.e. creativity) as well as the search, selection and implementation stages of new product development (i.e. innovation management) has been widely documented in the literature [5]. Their multidisciplinary character enables team members to integrate diverse knowledge sets and skills allowing for the creation of rich, novel combinations of ideas [1]. Their functional and discipline diversity increases the amount and diversity of information available to develop new products. Such information diversity not only fosters creative performance [6, 7, 8], but also aids decision making helping the NPD team members to identify and correct mistakes early on – such as manufacturing difficulties or market mistakes – leading to better product quality and saving time by reducing the need to deal with these problems later on [9][10][11].

One of the most common problems of cross functional teams is that different functions end up seeing the same information through different lens, leading to misunderstandings and conflict, and ultimately undermining process performance by reducing group cohesiveness and increasing job stress [10]. The difference between successful and unsuccessful cross functional teams is not however whether these

communication problems occur or not, but in the way in which they are overcome. In successful cross functional teams, the team members combine their perspectives in a highly interactive, iterative fashion which increases information content ultimately leading to effective intra-team communication. Unsuccessful cross functional teams approach development in a sequential manner, such that each functional groups ends up dominating a particular phase of the project [12].

The creative ability of cross functional teams is influenced by a range of organisational and market factors such as organisational structure, process and culture and the competitive pressure characterising the market in which the organisation operates [6, 13]. While some of these factors are exogenous (i.e. market competition, institutional support), other factors, in particular those related to the organisational culture and structure, can be manipulated by the organisations [1]. A number of such factors are identified in the literature as influencing the outcome of the team (see figure 1).

Figure 2 Stimulating creativity in cross functional teams: the role of contextual factors.



Trust supports team collaboration and increases the willingness of team members to share information openly and to admit to confusion [14]. Trust is based on **open, frequent and accurate communication** among team members [15] which increases the volume and diversity of information shared, reduces misunderstandings and builds job cohesion [10]. More accurate and more diverse information improves the quality of decision making and increases the team's absorptive capacity in that they become better positioned to understand and process the information that is being conveyed. Creativity is encouraged and higher productivity and faster pace of development in NPD is achieved [12, 16].

The extent to which the team is encouraged to **take risks** affects the willingness of the team to pursue untried ideas [3, 13]. Due to the inherently uncertain nature of new product development, risk taking and tolerance of failure is essential to support idea generation [3].

Cross functional team members also have to have appropriate support in place both in terms of having "idea time" i.e. a necessary level of organisational slack [3] and in terms of having top management support, primarily in the form of a long term vision that would enable these ideas to develop beyond the early conceptual stages [4].

Organisational slack refers to the difference between the resources currently needed and the total resources available to an organisation. When there is little environmental uncertainty, for example when a firm operates in a stable market, too much organisational slack represents a static inefficiency. When firms operates in dynamic markets which

require innovation and change, slack can act as a shock absorber, allowing scope for experimentation [2]. Providing the appropriate level of organisational slack – by providing employees with "idea time" to help generating innovative ideas and by supporting the development of these ideas into innovative products to generate commitment and involvement in the innovation process – is therefore associated with more creative organisations and with higher performance in new product development.

Creativity requires **long term top management support**. NPD projects pose a particular challenge to senior management concerning resource allocation between different new product ideas. On one hand, the development of new innovative products takes time, is highly uncertain, and the returns may not emerge quickly. This development requires "patient money" to support a long term NPD programme [3]. On the other hand, stakeholders via top management and sales and finance department require fast returns on their investment. Therefore, short term financial criteria are used in assessing NPD success and allocating resources to new projects. The role of senior management is to balance this tension between the demands for shorter term gains by top management and sales department versus the long term pressures for technology & product development plans of the R&D department. One way of dealing with this problem is for the senior management to focus not only on returns on investments (or sales) when deciding resource allocation, but on other considerations like future market penetration and growth [3], or on the strategic benefits that might accrue from having a particular portfolio of inter-dependent products. It is this long term commitment to major projects, as opposed to seeking short term, financial returns [3] that enables the R&D department to focus on longer term technology development. Long term commitment to major technology projects supports the development of innovative new products in the future.

Finally, developing **high involvement schemes** (HI) to elicit new ideas from the employees suggest an organisational climate that encourages staff commitment and rewards their creative efforts [3]. HI improves NPD not by generating new ideas, but by improving the ability of the organisation to support continuous innovation. HI schemes are about changing organisational culture – changing the ways in which people think and behave on a long term basis – and as any other organisational change it requires a proper strategic development programme in place [3].

The effects of cross functional teams and the range of enablers factors on creativity and ultimately on the success of NPD, both in terms of product effectiveness (for example in terms of product quality) and process efficiency (for example in terms of process speed) [16] are described in the table below.

Table 1 NPD practices regarding innovation and creativity and linkages to product success

Practice	*Effect on NPD*
cross functional teams	information diversity => product quality & speed in product development
frequent communication	information quality and volume => speed of product development & productivity of product development
organisational slack	ability to generate innovative ideas => support the development of innovative new products
long term top management commitment to major projects	support the development of innovative new products
attitude to risk taking	staff commitment and involvement in supporting continuous innovation
high involvement schemes	ability to generate innovative ideas + staff commitment and involvement in supporting continuous innovation

Each of these practices will be discussed in relation to the organisation under study in section 4. The next section discussed the design of this research.

3. Research design

This paper follows a single case study research design. The analysis is interpretative.

Semi structured interviews were used for data collection. Ten interviews were conducted in October 2007 with R&D management team members and HEAccs employees from related functions. With one exception, the interviews were recorded and then transcribed. Notes were also taken during the interviews. A report analysing the NPD was send back to the unit for verification.

Data analysis involved deductive coding and narrative building. A list of codes was developed prior to the data collection based on the literature review. The list was refined constantly during data collection and data analysis following an iterative process. Based on the codes, data reduction and exploration followed using data displays [17]. These displays led to the construction of case narratives which provided the input for the next section.

4. The case study

The parent organisation – MobPhone - is one of the leaders in the manufacturing of mobile phones. The R&D department under study is part of the accessory business unit (HEAccs) responsible for the development of mobile phone accessories such as bluetooth headsets and car accessories. Within the HEAccs unit, R&D represents the largest department with circa 250 people employed out of the total 300 within the unit.

In HEAccs R&D the overall NPD time is very short, varying between 1-3 months for simple products up to 12-13 months for complex new type of products. Speed to market is a key driver of product development due to the dynamic nature of accessories market characterised by hectic demand and short product development life cycles. A change in

management two years prior to the time when data was collected focused the attention on reducing the delays in development. In the past two years, as a result of the change in management, the unit achieved "0 slip" – i.e. no delays – in project execution in software.

Stimulating creativity and innovation in NPD using cross functional teams

HEAccs R&D adopts a cross functional approach both to idea generation and to actual product development. During the idea generation stage, product ideas are discussed during a cross-functional workshop which helps generate a multitude of product ideas. During the actual development phase, a cross functional product team is set up to manage product development, ensuring that the team has access to a diversity of information to aid decision making.

Generally, the involvement of the various functions in the team varies depending on (1) the type of product (new vs. variant); (2) the mode of development (in house vs. outsourced); and (2) the phase of the project (e.g. idea generation vs. actual development). For example, R&D involvement tends to be higher for products developed in house and during actual development, while Customer Care's contribution is higher for new products and during the later stages of the development. These variances were justified in terms of variances in the amount of effort required from the different functions during the different types / stages of product. While such an approach allows an efficient distribution of scarce resources during NPD, it also runs the risk that different phases of the process and different products will be dominated by different functional perspectives, which hampers communication and exacerbate the problems of poor intra-functional communication. For example, the limited involvement of R&D Software & Hardware during idea generation and of the Area Product Managers during the actual development was identified as a particular weakness of the process, limiting the quality of the products developed.

Trust & Communication

With few exceptions, communication within the product teams was very frequent, mostly informal and ad-hoc and by and large relied on face to face interaction. While intensive and face to face communication facilitated mutual understandings improving productivity, ad-hoc and informal communication was reported as one of the strengths of the NPD process increasing the speed of the process by facilitating fast coordination of NPD activities.

Physical co-location was the most important factor in explaining the amount and quality of intra-team communication. R&D operations are distributed across several sites in the country and outside. However, in general (but not always) different sites tend to be involved in different activities (i.e. one country used to develop car products while another was in charge with basic accessories and Bluetooth) which meant that product team members tend to be co-located. This co-location facilitated frequent and ad hoc information sharing between product team members. For example, the communication between R&D and Product Marketing, which were located on the same site but in different buildings, was less frequent and relied more on e-mails and phone calls rather than on face to face interaction due to the physical (and social) distance between them and the rest of the team. This distance was used to explain the difficult relation that R&D had with the Product Marketing. Instances of poor communication created problems

especially for the development of new products with a higher degree of complexity which required more intensive cross-functional interaction.

(Lack of) Organisational slack

Resource limitations - both in terms of limited human resources and significant time pressures – were identified as one of the major constraints during the NPD process. Limited resources constrain the selection process of the product concept, for example in terms of killing viable projects and justifying selective cross-functional participation during product development which diminish the performance of the NPD process. Most importantly, limited resources restrict the potential for innovation in NPD, as the work becomes focused on short term development rather than longer term research. Lack of adequate support for long term development forces HEAccs to focus on developing products based on existing technologies, rather than investing in technology scouting and core technology development to support radical technological innovation.

Lack of organisational slack also adds significant pressures on people who are forced to react fast and do not have enough time to concentrate on a single product. This means there is little space for thinking about improvements in existing products, and even less for thinking about ideas for new ones. As such, the focus tends to be on the getting products under development out fast to fit the fast changing demands.

Top management commitment - resource allocation criteria

In HEAccs, there are three criteria that senior management uses to guide resource allocation during the new product selection process: (1) product portfolio fit; (2) a sound business case; and (3) R&D resource implications. The decision happens during the concepting stage, before actual development starts.

The portfolio fit is assessed based on the “road map” including the products that are to be developed in the next interval. Portfolio fit assessment takes place at two levels. First, at the level of the business group, new ideas for accessories products need to fit with the phone products under development within the business group. At this level the assessment is based on the phones product annual road map and involves clear time table and market analyses. Second, at the unit level the product ideas for new accessories needs to fit the target users. At this level, the assessment is based on the six months road map (as accessories have in average a 6 months life cycle) and involves product usability, design as well as competitor analysis, market data and pricing structure, and sales results.

The business case assesses both the strategic considerations – in terms of identifying the drivers for the product – and the financial case behind the product – in terms of providing clear sales and revenue forecasts, and analyses concerning the long term profitability of the product.

The arguments based on portfolio fit and business case are made by the Product Management who generally develops the product idea propositions. These ideas are balanced against their cost in terms of R&D resource implications. It is this balancing act that dictates how resources are allocated and which product ideas are pursued. This decision is constrained by significant resource limitations which have forced the senior management to introduce a prioritisation system to allocate scarce resources between potential products. This systems means that potentially viable products with lower priority are regularly killed because of lack of resources.

Attitude to risk

The attitude to risk, in particular wide tolerance of failure was identified as one of the critical areas of the NPD process. Short product development life cycles means that decisions making is fast, short term focused and more flexible that in other units within MobPhone. Fast decision making mitigate the risks of operating in a dynamic market – it is better to take a wrong decision fast and then correct it along the way, than delaying the decision in the first place. This tolerance of decision making failure is facilitated by the nature of product development in HEAccs. Because the level of investment per product is relatively small (vis-à-vis the development of a new multimedia phone for example) and a large number of products are under development at any single time, more risk can be taken into the product.

High involvement schemes

At the time of the study, HEAccs R&D was experimenting with one such HI scheme. The scheme involved asking all unit members to suggest product ideas and then funnelling these ideas to the Product Managers for inclusion in the product portfolio. The ideas are filtered in the first instance by the Line Manager, and then by the management team before reaching the Product Managers. The scheme worked on the basis that the Line Managers would assess and select those ideas that are worth pursuing. The major rational behind the scheme was to motivate people to contribute ideas and to encourage creativity and innovation. The implementation of the scheme generated enthusiasm and people were keen to contribute. The scheme was successful in that a large amount of ideas were generated.

Despite the early enthusiasm, the sheer amount of ideas made it difficult for Line Managers to filter them effectively, resulting in a large list of ideas being submitted to the management team for evaluation. Time pressures compounded the problem by leading to a backlog of ideas. The major problem with the HI scheme is not that too many ideas have been generated, but that there is no framework that guides line managers (and the management team) in how to assess and deal with these ideas. The perception was that there is no clear strategic objective of what - and how - the organisation wants to achieve in the future with this scheme and what it requires from its employees.

5. Findings

The discussion of HEAccs identifies a number of challenges that the unit faced in trying to implement practices to support innovation and creativity (see table 3).

Functional diversity improves decision making aiding both product quality and the overall delivery time. The major danger here is that due to efforts to manage resources effectively, the active involvement of the different functions becomes sequential and a single function takes the lead during the development of a particular product or during particular phases of the process, which obstructs the informational benefits resulting from functional diversity.

Table 3 Challenges in the implementation of best practices in to support innovation and creativity in NPD

Practice	*Challenge*
Cross functional teams	Resource limitations and a focus on accelerating the speed of the NPD process means that involvement of the different functions in the team tends to be sequential which limits the benefits of the practice.
Frequent communication	Aided by the unit small size and by the physical co-location of the NPD teams.
	The clear delineation of products according to sites while aiding communication was seen as detrimental to long term cross-fertilisation between the different sites which stifled idea generation
Organisational slack	Management attitude to resource constraints as an exogenous factor means that little is done to build in organisational slack
Long term top management commitment to major projects	The dynamic market leads to short term focus which hampers commitment to creativity (which requires long term vision).
Attitude to risk taking	Smaller projects limit the exposure to financial loss as such encourages higher tolerance of failure.
High involvement schemes	Limited support from the management to the scheme and the lack of a clear objectives together with a ad hoc implementation means that scheme is unlikely to move beyond the initial stage

The organisation of product development in HEAccs is characterised by frequent and open communication and functional diversity in product development. The physical co-locations of most of the product team members (facilitated by the small size of the unit and the clear separation of product areas between the different sites) facilitated effective intra-team communication. Clear routines were implemented to deal with potential communication problems emerging with suppliers in the form of building in time in the process to accommodate any delays and efforts to develop trust and mutual understanding based on repeat interactions by pairing up product teams and suppliers. One potential danger here emerges from the clear separation of activities between the different sites. Such an approach enables effective intra-team communication in the short term, but limits the ability of the unit to develop a dynamic and flexible approach to NPD by incorporating different perspectives across different locations in their product teams. Overall, the effective communication between product team members facilitates effective cross functional work throughout the entire NPD process.

Severe resource constraints – in the form of lack of organisational slack and limited support to implement high involvement schemes - limit the ability of HEAccs to create a creative culture that would be inducing to innovation. Too often, time and resources are seen as a constraint or as a measure of outcomes, rather than as a variable that managers can influence, which both trigger and facilitate innovation and change. This was also the attitude in HEAccs R&D which regarded the resource constraints as an exogenous factor. There are however different ways in which organisational slack could to be built. For example, a dedicated team could be created that would work independently from the product development teams on product idea generation. This would require however that

not all resources are allocated to the existing product development teams. A less resource demanding approach would be to use product platforms for the development that would enable re-use of resources. The use of platforms would free existing resources as common elements could be reused across products. By providing some, but limited, time and resources, managers can minimize the rigidity that comes from work overload, and the laxness that comes from too much slack [2].

Top management commitment to innovation was mentioned as one of the major strengths of the NPD process. However, such commitment tends to be short focused emphasising fast development rather than long term investment in major projects. While such a short term focus is justified by a dynamic market which requires constant re-evaluation of product development to fit changing market demands, it also produces a myopic approach to NPD where all efforts are concentrated on keeping up the pace with existing market demands, rather than investing in longer term technology and product development plans. It is this longer term view that enables the development of innovative new products which will sustain future growth. To address this gap, the assessment of new product concepts and resource allocation should include longer terms objectives such market growth, or building an interdependent portfolio of products.

The attitude to risk is one of the most cost effective ways of encouraging a creative climate to stimulates innovation. Overall, the NPD process in HEAccs seems to be characterised by a high tolerance to failure. Such high tolerance to failure might have been aided by the relatively lower size of the HEAccs projects (compared with the phones) both in terms of time and resources. Such an approach encourages staff to commit and become involved in innovative projects.

The attempts to support a creative climate through the implementation of a high involvement scheme were met with enthusiasm and a large number of innovative ideas were generated as a result. To support staff commitment and involvement for innovation on a long term basis, the unit needs however not only to provide the required support to see these ideas through, but most importantly to clarify the strategic rationales for the implementation of this scheme. The high level strategic objectives of this scheme in terms of its contribution to the unit's overall business strategies need to be clarified. Once the strategic objectives are identified, a clear strategic framework can be developed to guide the implementation of the scheme. It is this framework that will assist the line managers as well as the management team in filtering effectively the ideas.

6. Conclusions

The paper has identified a number of challenges associated with the implementation of what is deemed as "best practices" in stimulating innovation and creativity in NPD. The major limitation of the paper is the single case study approach which while enables an in depth exploration of the approach to NPD, limits the ability to generalise its findings concerning the presence or absence of such challenges across a wide range of organisations. To enable such an objective, future research needs to adopt a more quantitative approach to research, either in the form of a large scale survey or a multi case study research design exploring the implementations of practices to support creativity and innovation in NPD.

Nevertheless, there are a number of contributions that this research has made. First, it has provided a starting point for an exploration of challenges – and ways of overcoming

them – associated with the adoption of practices to stimulate creativity. Much is made in the literature regarding the adoption of HI schemes for example, or ways of improving communication and cross functional teams to support idea generation, and such practices have been adopted widely in the industry. However, their implementation is often problematic. Challenges need to be first identified and then solutions need to be found to address them for organisations to be able to encourage creativity and innovation in their NPD. This paper represents a small step onto achieving this objective.

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